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ANNOUNCES

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CANADIAN
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# Venereal Disease Control During Wartime*

J. J. HEAGERTY, M.D., D.P.H.
*Director of Public Health Services*
*Department of Pensions and National Health, Ottawa*

IN view of the fact that Canada is at war, it is considered advisable to discuss the question of control of the venereal diseases from the standpoint of the protection of the soldier and the civilian. It would appear essential to review the incidence of the venereal diseases and the measures adopted during the last war for their control and, as a result of the experience gained at that time, to draw up a plan for their prevention and control both among soldiers and civilians.

There are no accurate figures of the incidence of the venereal diseases in the overseas armies of the various countries which engaged in the last war, but some idea may be gleaned of their prevalence by surveying the recorded figures of those diseases amongst Canadian forces at home and overseas. On referring to the Official Canadian History of the War, we find that there were 66,083 cases of venereal disease in the Canadian Army, of which 18,612 were syphilis, whereas the total sickness, exclusive of wounds, was 513,997. The ratio of the venereal diseases to total sickness was, therefore, approximately 12 per cent. Whether or not these figures are accurate, it is difficult to say, but the fact remains that the incidence of the venereal diseases was high.

At the time of the outbreak of the last war, there was very little information available regarding the incidence of the venereal diseases and, therefore, their importance was not recognized. As a result, in the early days of the war the problem was not given the serious consideration it merited and measures of control were not instituted at the outset but only when it became evident, on

**Presented at a conference on venereal disease control held under the auspices of the Department of Health of Ontario in Toronto on October 10, 1939.*

account of the number of soldiers and civilians infected, that the control of the venereal diseases among soldiers and civilians was an urgent and major problem.

In that section of the Official History of the War dealing with medical services, which was published in Great Britain by His Majesty's Stationery Office, the following statement is found:

"The diseases which probably caused the greatest amount of constant inefficiency in the home camps and which called for special preventive measures were venereal diseases. The incidence of these diseases was very high amongst troops of the Dominion contingents in somewhat marked contrast with their incidence amongst other troops."

If this statement is true, the greater incidence among Dominion troops was probably due to the fact that they had more money to spend than had English soldiers. Whether it is true or not, it supports the contention that the institution of measures for the control of the venereal diseases is of immediate importance.

When it became obvious that the adoption of measures for the prevention of the spread of the venereal diseases among the troops was urgent, an Army Department of Venereal Disease Control was established. The activities of that department are contained in a report for the year 1917. These activities comprised education by means of lectures and literature, and the establishment of early treatment centres and hospitals. Later, these were supplemented by the provision of early treatment packets containing 30 per cent. calomel cream, which were furnished to all who applied for them and instructions in their use given verbally. The early treatment centres and early treatment packets proved helpful. For example, at Pepinière Barracks in Paris, where from November, 1917, until March, 1918, early treatment packets were issued to men going on leave and disinfection treatment provided for men returning from leave, 53,441 early treatment packets were issued prior to leave and 25,017 disinfection treatments given following leave, the number of infections was negligible, and at the Canadian Depot, Havre, where 5,153 disinfections were given following leave, it is said that none of the men disinfected acquired venereal disease. This indicates the value of immediate treatment following exposure and disinfection treatment following leave.

In the British Army, personal disinfection was introduced early in 1916. Each British unit was provided with a compartment containing a receptacle for irrigation with potassium permanganate. Calomel ointment was made available in these compartments as well, and the men were urged to disinfect themselves after exposure. But these were not a success because of their location in urinals, the reluctance of the men to be seen going to them and, possibly, the length of time which elapsed between exposure and disinfection.

In 1917, Lt.-Colonel L. W. Harrison, of Great Britain, recommended that all troops should be supplied with tubes of calomel cream. Later, potassium permanganate lotion 1-1000 was added and all troops were provided with both. The Australian troops were provided with collapsible tubes of calomel, camphor and carbolic cream, and a packet of potassium permanganate tablets. These measures were found to be efficacious in reducing the incidence of the venereal diseases.

In contemplating preventive measures, there are certain factors that should be taken into consideration in regard to soldiers. The soldier population may be divided into three types: the man who resists temptation, the man who succumbs to temptation, and the man who gratifies his sexual desires. The first does not require protection; the second and third do. The majority of men fall within the second and third class. I think this can be accepted as true from our knowledge of the incidence of the venereal diseases.

This brings up the question of the measures to be adopted for the prevention and control of these diseases during the present war, both in respect of soldier and civilian. It is evident that these measures should be based upon the experience gained in the last war with soldiers and since the war with civilians. This suggests:

(1) Establishment of a Military Department of Venereal Disease Control to deal with the entire question of prevention and treatment among soldiers. Such a department should comprise men who are experienced in the prevention, diagnosis and treatment of these diseases.

(2) Creation of a Civilian Committee of Venereal Disease Control to deal with the problem among civilians. The civilian committee should be composed of men and women who are experienced in dealing with prevention and control among civilians and should include the organized health departments of the various provinces and voluntary agencies.

While the details of the campaign should be left to the discretion of the Military Department of Venereal Disease Control and the Civilian Committee, the following measures are suggested:

In considering prevention among soldiers, primary consideration should be given to the provision of wholesome recreation and amusement during hours off duty. Efforts should be made to inform the soldier in regard to the prevalence of the venereal diseases during wartime and the probabilities of becoming infected through sexual contact. For this purpose lectures should be given by medical men specially trained for the purpose. These lectures should include full information regarding prophylactic measures. The necessity of obtaining early treatment immediately after exposure should be stressed. All lectures should be approved by the Military Department of Venereal Disease Control.

As a preventive measure, early treatment packets should be made available to all troops.

"Calomel ointment in 33 per cent. strength incorporated in lanolin as a base and carefully mixed is now generally recognized as effective if applied under expert supervision shortly after exposure. It was introduced into the United States Navy in 1908 and into the Army in 1909. Experience during the World War showed the value of calomel prophylaxis when carried out under military control." (Rosenau.)

The following is a quotation from the recent publication of the United States Public Health Service, "Management of Syphilis in General Practice":

"Under conditions of military control, especially in our own Army and

Navy, chemical prophylaxis has been brilliantly successful in reducing the incidence of venereal disease to a remarkably low level."

This book refers to chemical prophylaxis as *early treatment* applied before the organisms have had time to penetrate the tissues. The formulae recommended for use in the United States Army and Navy, which have proved their efficacy, are as follows:

| United States Army | Parts |
|---|---|
| Hydrargyri chloridum mite | 30 |
| Adeps benzoinatus | 65 |
| Cera alba U.S.P. | 5 |

| United States Navy | Parts |
|---|---|
| Calomel | 33 |
| Camphor | 2 |
| Phenol | 3 |
| Anhyd. lanolin | 39 |
| Benz. lard. | 20 |
| Beeswax | 3 |

Early treatment centres, where disinfection may be applied under skilled supervision, should be established at all depots, as was done in the last war.

With regard to the early treatment packet, it is recommended that each packet should be enclosed in a wrapper containing a warning against exposure to the venereal diseases and pointing out that, in view of the increase in venereal disease which takes place during war, the soldier who has exposed himself may consider himself *most probably* infected; moreover, that the packet is supplied for the purpose of early treatment *only pending disinfection at an early treatment centre.* It should also be stressed that early treatment is not a guarantee that the individual who has exposed himself will not acquire a venereal disease but that its use is imperative *pending a visit to an early treatment centre.*

Disinfection in the early treatment centres should be provided by men who have been specially trained for the purpose. The following was the early treatment generally used in the last war:

(1) Washing with soap and water.
(2) Washing with 1 in 2000 bichloride of mercury.
(3) Washing first half inch of urethra with argyrol or other disinfectant.
(4) Injection of 10 per cent. argyrol or other disinfectant.
(5) Rubbing exposed parts with 30 per cent. calomel ointment.

The duties of the Civilian Committee should comprise:

(1) The education of the public by every available means.
(2) The control of prostitutes through the enforcement of existing provincial laws for the prevention of dissemination of venereal disease.
(3) In war areas special efforts should be made to keep the neighbourhood of camps free from prostitutes.

It is suggested that the Civilian Committee should form local committees in all parts of Canada. To each lay committee a physician should act as adviser. Finally, there should be close co-operation between the Military Department of Venereal Disease Control and the Civilian Committee.

The problem of the control of the venereal diseases among soldiers and civilians is urgent and no time should be lost in instituting measures for their protection.

# Interpretation of Serodiagnostic Procedures in Syphilis

## The Findings of the Routine Tests conducted during 1938 in the Central Laboratory of the Ontario Department of Health

A. L. MacNABB and G. MATTHEWS
*Division of Laboratories*
*Department of Health of Ontario, Toronto*

IN 1906 Wassermann, Neisser, and Bruck employed complement fixation, discovered by Bordet and Gengou, as a diagnostic procedure in syphilitic infection. During the past thirty years many changes have been made in the original technique and many new procedures have been introduced. The objective of the modifications has been to make the test more sensitive. Following the introduction of the Wassermann test, workers endeavoured to evolve other tests, particularly tests based upon the phenomenon of flocculation. Just prior to and following the World War a number of methods were suggested and reports were published concerning their value. Many of these did not stand the test of time and are now only of historical interest.

The importance of standardizing the procedure for conducting the Wassermann test and for evaluating other serological procedures was recognized by authorities in various countries. Under the auspices of the Health Section of the League of Nations an international conference (1) was held at Copenhagen in 1923 to consider this subject. The findings of the conference indicated that the Wassermann test was considered to be superior to any of the flocculation tests for which sufficient information was then available. In 1924 Kahn, in the diagnostic laboratories of the State Department of Health of Michigan, described a new procedure which is known as the Kahn test. The technique which Kahn used in his original method has been modified. The test now is called the Standard Kahn Test. At a second international conference (2), convened under the auspices of the League of Nations in Copenhagen in 1928, the Kahn test was considered to be superior to the Wassermann test. The conference reported that from the data submitted the Kahn test gave the highest number of positive results, and non-specific reactions were not found to occur with the sera of control groups of non-syphilitic persons. At a third international conference (3), convened at Montevideo in 1930, the Kahn test was again found to be superior to any other test, including the Wassermann test. Following the introduction of the Kahn test, other tests dependent on flocculation have been introduced, namely, the Hinton glycerol reaction, Kline slide test (both for diagnosis and for exclusion), the Eagle test, Kahn Presumptive, Johns, and Laughlen tests. The recent surveys of serological procedures conducted by the American Evalua-

tion Committee cast light on the relative sensitivity and specificity of the various methods used in these tests. At first the tendency to increase the sensitivity was advisable and necessary. The question arises today, should the sensitivity of these tests be further increased? Although thirty years have passed since the introduction of the Wassermann and other tests, the full significance of these tests has just begun to be realized and adequate information become available for their interpretation.

## THE WASSERMANN REACTION

Syphilitic foetal liver, from which Wassermann extracted the antigen for his test, contained large numbers of the treponema pallidum, the specific incitant of the disease, thus the reaction was considered a specific one. The fixation of complement is perhaps the most sensitive and highly specific in vitro test which has been evolved for the study of immunity. Landsteiner's observation, together with the report of Marie and Levaditi, that a lipoidal extract of normal beef-heart muscle might be substituted for the antigen prepared from syphilitic foetal liver, and the subsequent development of different methods for the diagnosis of syphilis, have altered earlier viewpoints. All antigen extracts used in the various serodiagnostic tests of syphilis contain lipoids. Research findings suggest that lipoids are essential for the various reactions. Studies (4, 5) have been conducted in an endeavour to reveal the nature of the action of the lipoids, more particularly of cholesterol, lecithin, and cephalin. Of these, the acetone-insoluble lipoids, chiefly lecithin and cephalin, form the basis of the antigen commonly used in complement-fixation tests. The research conducted in using the treponema pallidum antigen and studying the comparative results obtained from its use with that of lipoidal antigen has failed to lift the serodiagnostic test for syphilis from the realm of empiricism, and has therefore added to rather than simplified the complicated procedures necessary for the proper performance of these tests.

## THE KAHN TEST

The Kahn test (6) is the most widely used flocculation test. Kahn notes five requirements (7, 8) for optimum flocculation in syphilis: (a) there must be optimum concentration of antigenic lipoids in the antigen—excessive or deficient concentration prevents precipitation; (b) there must be a correct relationship between the antigen and the serum suspension; (c) the antigen suspension must be in a proper physical state; (d) shaking is an aid, as it hastens flocculation by the collision between particles; and (e) total dilution of the suspension should be a minimum since increasing the amount of saline tends to reduce flocculation.

After fifteen years' experience with the Standard Kahn test in our laboratory, we have proven the Kahn test to be a reliable diagnostic test. The standard antigen for this test will remain standard for a long period of time and is not affected by sunlight as is the case with a more sensitive antigen. The simplicity and speed with which this test may be conducted commend its use in laboratories where a more complex complement-fixation test is not possible. Irrespec-

tive of the proven specificity of the Kahn test, experience has shown that duplicate tests must be conducted.

In regard to the phenomenon of flocculation, Eagle suggests that there is not merely a superficial similarity between the flocculation in syphilis and bacterial agglutination or between the Bordet-Gengou phenomenon (specific complement fixation) and the Wassermann syphilitic test. It is considered that the antibody in the syphilitic serum is an altered globulin (reagin) and that this antigen combines with the colloidal particles of the antigen (beef-heart lipoid). Kahn and others believe that the surface film thus formed sensitizes the particles to flocculation by the electrolyte present, and also that the surface film in the Wassermann test adsorbs the complement. The changes in the serum in syphilis may therefore represent an antigen-antibody response to syphilitic infection. The fact that beef-heart antigen may be used instead of spirochaetal antigen in the test does not exclude that possibility.

Kahn (9), when studying the ultramicroscopic Kahn reaction, found that there was a union of globulin and lipoidal particles when either normal or syphilitic serum was placed in contact in appropriate amounts with Kahn antigen. Following the addition of saline in the test, the globulin-lipoidal union was dispersed in the case of normal sera, whilst the union was permanent in the case of syphilitic sera.

## SELECTION OF TEST

Serological reactions, therefore, should be considered from two different standpoints: firstly, selecting the tests which will provide the most reliable results under the conditions which exist in the laboratory; and, secondly, selecting from the purely investigational viewpoint a test which may serve as a reliable control of other methods, thus advancing our knowledge.

There are two schools of thought concerning the serodiagnosis of syphilis, one advocating the complement-fixation test and the other preferring flocculation or precipitation tests. Those favouring the flocculation methods have stated that such tests are more sensitive than are complement-fixation tests and that the flocculation tests are more readily controlled, inasmuch as only two reagents, namely antigen and patient's serum, are used, whilst in the complement-fixation test (Wassermann) the other necessary biological reagents, namely sheep's red cells, hemolysin and complement, are at times difficult to standardize and control. Certain claims have been set forth that a sensitive flocculation test will always produce a positive reaction in blood serum from patients affected with neurosyphilis, thus avoiding the necessity for a lumbar puncture in these cases. This latter claim, however, is quite unfounded. In spite of the fact that the flocculation test is readily conducted and is a practical, economical method for most laboratories, no test is of value unless the technique proposed by the author is rigidly adhered to, and the antigen used is either procured from, or is so standardized as to be identical with antigen produced by the author of the test. No one test, however carefully standardized and performed, will reveal the presence of syphilis in every case. Unduly increasing the sensitivity of the flocculation test antigen

may simply result in increasing the number of positive reactions in specimens from adequately treated cases (10).

Whether a laboratory chooses a reliable proven flocculation test such as the Standard Kahn or a complement-fixation test (Wassermann) of proven merit such as that employed in the Division of Laboratories and Research of the New York State Department of Health or by Kolmer, is a matter of individual choice. Irrespective of what method is chosen for the official test, a control test also should be conducted. Should the Standard Kahn test be the official test, the specimens should be subjected to a second test, either a reliable complement-fixation or another flocculation test. In laboratories where large numbers of specimens are received, subjecting all specimens received to two sensitive exclusion-test methods, one being a flocculation and the other a qualitative complement-fixation, is a reliable and practical procedure. In cases where positive results are obtained or there is disagreement in the results of the two exclusion tests, the specimen should then be further checked by a reliable quantitative procedure. The introduction of many so-called new flocculation tests has no doubt delayed accurate control of the disease. Slight modifications creating a new name, probably at the expense of specificity, should be banned. Laboratory workers should recommend the use of proven methods only, the merit of which has been established by careful research.

## QUANTITATIVE TESTS

Kahn has proposed a quantitative Kahn test (11). The quantitative Kahn test expresses the titre, or the dilution of patient's serum in which flocculation was evidenced, in identically the same manner as the agglutination reaction gives the typhoid or paratyphoid titres of sera in persons ill with these infections. The Kahn titre is obtained by making a series of dilutions of a positive reacting serum, the highest dilution of serum in which flocculation is evidenced being recorded as the titre.

Dr. Ruth Gilbert (12, 13), of the Division of Laboratories and Research, New York State Department of Health, served as referee for a number of years in the development of standard methods for the complement-fixation test for syphilis for the American Public Health Association. Dr. Gilbert prepared an outline by which principles of technique might be established, and after extensive study this outline was approved. Dr. Augustus Wadsworth and Drs. Frank and Elizabeth Maltaner (14, 15) have outlined a quantitative complement-fixation test method. The titre obtained by their quantitative method is the ratio of the amount of complement required for 50 per cent. hemolysis in the presence of serum and antigen to that similarly required with serum alone. As yet this New York State method has not become a routine procedure in our laboratory. Through the kindness of Dr. Wadsworth it has been our privilege to refer to his laboratory specimens which have yielded doubtful and irregular reactions in our laboratory. In each instance this quantitative procedure has been of great assistance to the clinician.

The results of quantitative tests should be helpful in enabling the physician to evaluate anti-syphilitic therapy. A patient's serum may show a certain titre prior to the institution of treatment and then, following intravenous therapy with arsenical preparations, show a diminution in titre, the result thus tending to denote that the treatment is effective. Quantitative test results are often helpful in serologically resistant cases and in questionable cases where doubtful reactions have been obtained by a qualitative method. Immediately following the administration of treatment the quantitative test may show a temporary rise in titre, and later a diminution which often continues.

The reporting of results by the symbols 1+, 2+, 3+, and 4+, on qualitative tests is a procedure which should be discouraged. The terms positive, doubtful, and negative also fail to render to the clinician adequate information, especially in instances where doubtful results are recorded. Quantitative test results afford the laboratory an opportunity of rendering valuable service to the clinician and the patient.

## THE ROUTINE PROCEDURES IN THE SERODIAGNOSIS OF SYPHILIS IN THE ONTARIO DEPARTMENT OF HEALTH

In Ontario the Division of Laboratories is organized with a central laboratory in Toronto and seven branch laboratories in different parts of the province. The outline of the procedures followed relates to the central laboratory.

In the central laboratory during the year 1938 56,628 tests were conducted on blood specimens submitted for the serodiagnosis of syphilis. Prior to July 1, 1937, all specimens received were subjected as a routine to both Standard Kahn and Kolmer Wassermann tests. Since that date the routine procedure has been to subject all specimens to both the Standard Kahn and Hinton flocculation tests. The change was deemed timely due to the fact that the number of specimens received had markedly increased and for the satisfactory performance of routine Wassermann tests additional staff, involving increased expenditure, would have been necessary. It was further justified by the fact that 93 per cent. of the specimens received yielded negative results. In all cases where the results of the Standard Kahn and Hinton flocculation tests are not in agreement, the specimen in question is further studied, using the Kolmer Wassermann technique (recent modification). Clinicians are advised that when considering the laboratory results, especially in treated cases, it is advisable to give first importance to the results of the Standard Kahn and Kolmer Wassermann tests if the results of the Standard Kahn and Hinton tests are not in agreement. The Standard Kahn test therefore is accepted as the official test. This decision was based on the specificity of the Standard Kahn test as shown in the findings of the several international conferences which dealt with this subject. The sensitivity of the Kolmer Wassermann test is now about equal to that of the Standard Kahn test. The greater sensitivity of the Hinton test renders it suitable as an exclusion test.

Quantitative Kahn tests have been conducted, when requested by the clinician, on all positive sera from treated patients. In table I an outline of the routine work conducted at the central laboratory during 1938 is presented.

TABLE I

BLOOD SPECIMENS RECEIVED AT THE CENTRAL LABORATORY
ONTARIO DEPARTMENT OF HEALTH, 1938

| | |
|---|---|
| Total tests for the year 1938 | 56,628 |
| Complete agreement of Kahn and Hinton tests | 56,154 (95.78%) |
| Total number not in complete agreement | 2,474 (4.22%) |
| Total number of tests where the Hinton was more sensitive than the Kahn | 2,316 (3.95%) |
| Total number of tests where the Kahn was more sensitive than the Hinton | 158 (.27%) |
| Net margin of greater sensitivity of Hinton over Kahn test | 2,158 (3.68%) |

From the results outlined in table I it will be noted that the Hinton test showed a greater sensitivity in 2,158 specimens (3.68 per cent.). It will be noted also that there was agreement in the results obtained from the Standard Kahn and Hinton test in 56,164 specimens (95.78 per cent.).

Following the publication of a paper by Kahn, in which he pointed out the increased sensitivity of the Presumptive Kahn over the Standard Kahn, a comparative study was conducted on 2,111 specimens of blood sera from untreated cases. In table II the results obtained in this series are presented.

TABLE II

COMPARISON OF RESULTS OF STANDARD AND PRESUMPTIVE KAHN TESTS IN THE EXAMINATION OF 2,111 SPECIMENS OF BLOOD SERA FROM UNTREATED CASES

| | | Standard Kahn Test | | |
|---|---|---|---|---|
| | | Positive | Doubtful | Negative |
| Presumptive Kahn Test | Positive | 95 (4.5%) | 32 (1.5%) | 27 (1.2%) |
| | Doubtful | 0 | 8 (0.4%) | 13 (0.6%) |
| | Negative | 0 | 0 | 1,936 (91.7%) |

The Presumptive Kahn yielded positive results in 27 (1.2 per cent.) of cases where the Standard Kahn was negative. There was agreement in 2039 (96.6 per cent.) of the specimens examined in this series. An important point is that the Standard Kahn did not yield any positive results where the Presumptive Kahn was negative. This serves to demonstrate that the Presumptive Kahn is a valuable aid when used as an exclusion test.

A third series, including the blood sera from 347 treated cases, was tested using the Standard Kahn and the Presumptive Kahn (sensitized antigen). The results are presented in table III.

TABLE III

COMPARISON OF RESULTS OF STANDARD AND PRESUMPTIVE KAHN TESTS IN THE EXAMINATION OF 347 SPECIMENS OF BLOOD SERA FROM TREATED CASES

| | | Standard Kahn Test | | |
|---|---|---|---|---|
| | | Positive | Doubtful | Negative |
| Presumptive Kahn Test | Positive | 137 (39%) | 22 (6%) | 27 (8%) |
| | Doubtful | 0 | 43 (12%) | 17 (5%) |
| | Negative | 0 | 0 | 101 (29%) |

The increased sensitivity of the Presumptive Kahn is readily demonstrated, inasmuch as 27 (8 per cent.) of the specimens yielded positive results where the Standard Kahn was negative. In other words, in testing a specimen of blood serum from a treated case using a highly sensitized method, the number of positive reactions is greatly increased. Kahn has recently drawn attention to the importance of this fact in a paper published in the September, 1939, issue of the *University Hospital Bulletin* of the University of Michigan.

## DISCUSSION

In discussing the results obtained from the Standard and Presumptive Kahn tests in the 1938-1939 evaluation studies, Kahn has pointed out that the results are comparable since the same sera were used in both tests and in neither case were false positive or doubtful reactions obtained. The findings in the 1938-1939 evaluation studies are presented for reference in tables IV and V. Comparison of the sensitivity of the Standard and Presumptive Kahn reactions in two groups of treated syphilis cases is presented in table IV, and in table V the findings in regard to the sensitivity of the Standard and Presumptive Kahn reactions in different stages of syphilis.

TABLE IV

SENSITIVITY OF THE STANDARD AND PRESUMPTIVE KAHN REACTIONS IN THE 1938 AND 1939 EVALUATION STUDIES

| Test | Number of Syphilitic Cases | Positive | Doubtful | Negative |
|---|---|---|---|---|
| 1938 Evaluation Study | | | | |
| Standard | 200 | 141 | 9 | 50 |
| Presumptive | 200 | 158 | 2 | 40 |
| 1939 Evaluation Study | | | | |
| Standard | 217 | 168 | 18 | 31 |
| Presumptive | 217 | 190 | 1 | 26 |

TABLE V

SENSITIVITY OF STANDARD AND PRESUMPTIVE KAHN REACTIONS IN DIFFERENT STAGES OF SYPHILIS, IN 1938 AND 1939 EVALUATION STUDIES

| Clinical diagnosis | Standard Test Positive and Doubtful Reactions | Presumptive Test Positive and Doubtful Reactions |
|---|---|---|
| 1938 Evaluation Study | | |
| Primary | 3 | 3 |
| Secondary | 8 | 9* |
| Tertiary | 46 | 46 |
| Congenital | 5 | 5 |
| Neurosyphilis | 31 | 34* |
| Latent | 57 | 63* |
| 1939 Evaluation Study | | |
| Secondary | 4 | 4 |
| Tertiary | 26 | 26 |
| Congenital | 6 | 6 |
| Neurosyphilis | 19 | 20** |
| Latent | 128 | 132** |

*The 10 instances in which the presumptive test is positive and the standard test is negative represent treated cases.

**The 1939 evaluation study does not list the cases as treated and untreated.

One fact of particular interest in table V is that the Presumptive Kahn test yielded positive results in 15 cases, 10 of which were latent syphilis and 4 neurosyphilis. A second fact of interest, shown by the 1938 survey in which the treated and untreated cases are classified separately, is that the cases in which the Presumptive test was positive and the Standard test was negative, were treated cases and not diagnostic cases. If the results of the Presumptive tests are compared with the diagnostic Wassermann test, the greater sensitivity of the Presumptive test is confined largely to latent cases. In neurosyphilis spinal fluid tests are also valuable as diagnostic aids. Therefore, the difference between a standard and sensitized method lies in the fact that the more sensitized method yields a greater number of positive results in latent cases.

The Presumptive Kahn test is a valuable aid, when used as an early diagnostic or exclusion test. In spite of its marked sensitivity it has a reasonably good record for specificity, as has been shown in all the evaluation studies. The simplicity of the Hinton test and its greater sensitivity over the Standard Kahn test render it suitable as an exclusion test in routine practice. The results of this test, however, should be controlled by the Standard Kahn or a reliable complement-fixation method such as the Kolmer Wassermann. When considering laboratory findings of treated cases of syphilis, the results of the Standard Kahn, Kolmer Wassermann, or other tests of equal merit in regard to specificity and sensitivity should only be considered. Positive results in hypersensitive exclusion tests should be interpreted with caution, especially in treated cases. Quantitative tests should be performed and reported in all positive cases. The limitations of all serological reactions in syphilis are being recognized. The empirical nature of the serological tests has already been mentioned. It is generally assumed that a conjugated protein lipoid is responsible for the production of flocculation and complement-fixation in the tests of sera in syphilis. The possibility is that the protein fraction is furnished by the spirochaetes and the lipoid fraction by the host's broken-down tissue. Kahn (16) feels that negative serological reactions in early primary syphilis may be due not to lack of antibody formation, but due to the removal of antibodies by circulating spirochaetes in the blood stream. As the number of spirochaetes is decreased with the development of immunity, large amounts of antibody circulate in the blood stream, thus the serological reaction becomes positive. The negative serologic reactions in syphilis which occur at times do not place these tests in disrepute. As syphilis manifests itself in various forms there may at times be such a minute amount of syphilitic antigen present in the tissue as to be inadequate for antibody production. Fortunately these conditions are temporary and the reactions become positive either spontaneously or as a result of therapy. Fluctuations occur in serological results from day to day, which may, in rare instances, be due to faulty laboratory technique, but most frequently to the fact that these variations depend on changes in the quantity of antibody (syphilitic reagin) present in the blood stream. The amount of antibody present in the blood stream is dependent on the quantity of spirochaetal material available for the stimulation of antibody production. As spirochaetal activity varies, naturally so does antibody pro-

duction. Differences in results with two tests, one a flocculation, the other a complement-fixation, are due to differences in sensitivity of the two methods, rather than to different antibodies. The final interpretation of the result of any test must rest with the clinician. It is his duty to interpret the laboratory findings in the light of the patient's history and clinical manifestations.

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# Some Aspects of the Child Health Program in Canada*

ERNEST COUTURE, M.D.
*Director*
*Division of Child and Maternal Hygiene*
*Department of Pensions and National Health*
*Ottawa*

IN 1937 Canada lost 16,693 infants. This represents a rate of 76 per 1000 live births. It is generally conceded that, in view of our present knowledge and prevailing conditions, the maximum loss should not exceed 45 per 1000. Consequently our failure in this respect in 1937 may be represented in round figures by 6600 infant deaths; that is to say, the difference between the actual rate of 76 and the accepted minimum of 45. Is it not reasonable to assume that in a like proportion we have failed to provide our children with adequate health protection? In my opinion the above-mentioned facts amply justify drawing attention to child hygiene as a health problem of first importance.

It might be suggested that our experience in 1937 (when the infant death rate increased by 15 per cent. over the previous year) is not representative of the actual situation. Even granting this, the rate of 76 reached in 1937 would tend to prove that our organized efforts to cope with the problem are not yet as efficient as they might.

For a number of years child hygiene has been uppermost in the minds of those interested in health problems. It has been the principal subject of discussion, and the object of constant and sustained efforts. Some success has been achieved in this field as a result of advances in medical science, particularly in respect to sanitation and in the prevention and control of communicable diseases. With these there has been an increasing interest in all health matters and the public has been better informed concerning the needs. Child health clinics have been increased in number and there has been a widening of medical, nursing, and hospital facilities.

Some twenty years ago the infant mortality rate was as high in certain sections of the country as 300 per 1000 live births. In order to appreciate the progress made, let us compare the figures of 1926 with those for 1936, when we had the lowest infant death rate ever recorded in Canada. In 1926, 23,692 infant deaths were recorded, a rate of 101 per 1000 live births, in contrast with 14,574 infant deaths in 1936, a rate of 66.

Progress has been made in reducing the number of deaths from congenital debility. There has been a substantial reduction, too, in the number of deaths

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attributed to prematurity. In 1926, 5083 deaths were recorded from this cause, the rate being 2184 per 100,000 live births. In contrast, in 1937 there were only 3458 deaths (1570 per 100,000 live births), constituting a reduction of 1625 deaths. There was a slight improvement in the number of deaths attributed to injury at birth. In 1926, 949 deaths were so attributed and in 1937, 861. Pneumonia accounted for 2487 deaths of infants in 1926 and 1914 in 1937. Among the communicable diseases, whooping cough was responsible for 773 deaths in 1926 and 485 deaths in 1935.

An analysis of our present position in regard to infant mortality shows rates varying from 101 to 56 in the different provinces. In cities, our latest records show a mortality rate as high as 297 and as low as 31.

*Rural and Urban*

A comparison between rural and urban areas shows that there is little difference in the infant mortality rate, the rate for cities being 63.7 and for the rural population 68.5. While the cities afford more facilities for care and treatment, the country has the advantage of better conditions for promoting good health. Nevertheless, it is reasonable to expect a larger measure of improvement in the rate for cities than is evidenced in the present figures.

*Age*

In 1937 2627 deaths (16 per cent.) occurred in the first twenty-four hours of life. In over half of these (1486) death was attributed to prematurity and 402 were recorded as having died from injuries received at birth. The remainder of the deaths which occurred on the first day of life were attributed to convulsions, syphilis, tuberculosis, pneumonia, influenza, measles, etc.

During the first month of life, 7527 deaths were recorded, representing 45 per cent. of all the infant deaths—a rate of 34 per 1000 live births. Of these 7527 deaths, 3111 were recorded as due to prematurity, 907 to congenital debility, 832 to injury at birth, 286 to diarrhoea and enteritis, 248 to pneumonia, 126 to influenza, 42 to syphilis, and 10 to tuberculosis. These figures show where a saving might be effected.

During the remaining eleven months of the first year of life, 9166 babies died. The most important cause of death during this period was diarrhoea and enteritis, which accounted for 2776 deaths. Pneumonia took a toll of 1666 lives, influenza 813, whooping cough 471, congenital debility 346, syphilis 160, diphtheria 21, and scarlet fever 11.

In 1937 the total number of deaths among children under five years of age was 21,970. This means that, with the present death rate applying, one out of every ten children will have died by the fifth year.

One cannot discuss the subject of child health without referring to the steadily declining birth rate which has been so noticeable during these last few years. In 1926 the birth rate was 24.7 per 1000 population and by 1937 it had dropped to 19.9. If the rate of 1937 had been on a par with that of 1926, we

would have had 54,083 more live births in 1937. The declining birth rate enhances the value of child life and health in Canada, where the population is so small in relation to the size of the country.

In 1937, 6275 stillbirths were recorded in Canada. Out of 200 autopsies carried out by Dr. McGuinness of Winnipeg on stillborn babies, 23 per cent. of deaths were found to be attributable to intracranial haemorrhage; 18 per cent. to prematurity; 14 per cent. to atelectasis; 5 per cent. to asphyxia; and 1.5 per cent. to congenital syphilis. These are conditions in respect of which a proportion of lives might have been saved through proper prenatal and intranatal care.

## CHILD HEALTH

The volume of morbidity occasioned by the acute communicable diseases, as published in official reports, is very large. In 1937 there were 17,217 cases of whooping cough, 31113 cases of diphtheria, 16,735 cases of scarlet fever, and 57,413 of measles. Tuberculosis, pneumonia, and other respiratory infections, as well as diarrhoea and enteritis, and typhoid fever, account for a very large number of cases of illness and deaths. The need for the application of all our knowledge for the prevention of these diseases is very evident.

Health records collected in schools in Toronto show that 4 out of every 10 children examined by school doctors were found to have physical defects. In the last ten years approximately 90,000 Toronto school children were found with one or more defects. I am sure that if the records for other parts of the country were examined, similar conditions would be found.

The following figures, taken from an estimate made by the Canadian Welfare Council as to the number of handicapped children in Canada, are of particular significance in respect to school records:

466,000 children were found to be improperly nourished.
230,000 suffered from impaired hearing.
77,000 had weak or damaged hearts.
35,000 were mentally retarded.
30,000 suffered from tuberculosis.
3,800 were partially blind.
1,080 were wholly blind.
1,400 were totally deaf.

The results of inadequate care during the early years of life may be illustrated by quoting from a report of Charles W. Taussig, a noted scientist of the United States. Following a physical examination of 1800 boys and girls in a mid-west industrial city, 43 per cent. were found to be unemployable by private industry because of their physical condition, but it was estimated that with medical treatment this large proportion *could* be reduced to 8 or 10 per cent. It is suggested that with proper early care this proportion of unemployable youth *would* unquestionably have been reduced to the same extent.

## DISCUSSION

It is generally agreed that our infant death rate is still much too high. Of 12 nations for which we have data for 1937 (some are preliminary figures), Canada ranks ninth. New Zealand come first with a rate of 31; Australia second with a rate of 38; Sweden third with 46; the U.S.A. fourth with 54. These are followed by the Union of South Africa (white) with a rate of 57; England and Wales, 58; Denmark, 66; Irish Free State, 73; Canada, 76; Northern Ireland, 77; Scotland, 80; and Italy, 109.

In bringing to your attention so many well-known facts, my intention is not so much to illustrate the need and urgency of correcting conditions causing such a great loss of life and eventually accounting for a high degree of ill health, as to stress the importance of improving our child-health machinery. The argument may be offered that, in view of the numerous factors inherent in conditions obtaining in Canada—sparse distribution of population, extreme changes in temperature, diverse racial, social, and economic characteristics—the problem is one which is exceedingly difficult to solve, having in mind our objective. While this is readily admitted, the fact remains that special efforts should be made to cope with every phase of the situation. At present it would seem that the facilities we have in this field are governed not so much by actual needs as by financial resources and by pressure brought to bear by various emergencies.

An example of what may be accomplished along these lines may be found in the experience of Hamilton, Ontario, a city of some 154,000 inhabitants, which has had no deaths from diphtheria since 1930, and no cases registered since 1932, according to the latest figures. Toronto reports a diphtheria case-rate of only 5.7 per 100,000 population, and not a single fatality from this disease in 1937. Montreal, with a similarly active program against this disease, brought down the mortality rate from 29.9 in 1927 to 2.9 in 1937.

On the other hand, one city reports that only 35 per cent. of children under the age of 4 years are immunized, while 68 per cent. of all deaths due to diphtheria in that city occur in that age-group. Furthermore, the favourable results cited reveal a striking contrast with conditions encountered in other centres where severe epidemics have been experienced. Canada as a whole recorded 3113 cases of diphtheria in 1937.

The present degree of effectiveness of scarlet fever immunization would seem to warrant a more general application of this protection. As an illustration, in the city of Edmonton the incidence of scarlet fever was 14 times greater among 6000 unprotected children as compared with an equal number who had been inoculated. As mentioned previously, there were in Canada in 1937, 16,675 cases of scarlet fever. Although a specific means of prevention exists for this disease as well as for certain other communicable diseases, we are failing to control them through our neglect to take advantage of the available measures.

While we are busily engaged with the problem of infant mortality, and with the health of school children, very little attention is paid to the health of children

of pre-school age. The morbidity statistics to which I have referred suggest that in this field more attention is required.

One of the main obstacles encountered in our efforts to promote good health is the failure of the public to grasp the value of the principle involved. Is this not the reason why we often meet with a lack of interest, and even with opposition?

For years it has been realized that our recommendations concerning the practice of preventive medicine cannot be forced upon the general public. Therefore the education of the public is, quite rightly, one of our main activities, and we should continue to extend this phase of our work. I suggest, however, that much waste of energy, time, and money may result from a lack of system. The broad principles of hygiene may be taught by general methods, such as the distribution of pamphlets, newspaper articles, radio broadcasts, etc., but when it comes to the application of definite health measures, specific efforts would seem to be more effective. We all know that the remedy for many situations lies not so much in educational efforts as in making services available.

An excellent weapon, which is seldom used to full advantage, is statistical information. If properly used, such information is most effective in creating a favourable public opinion. Periodical publication of statistics with appropriate comments would be most valuable.

The advisability of holding a National Baby Week is a question which is worthy of consideration. As time does not permit me to discuss the value of such a national undertaking, I leave it with you as a suggestion for consideration.

In the light of what I have presented so far, what stands out most prominently? Is it not the lack of plans for co-ordinated effort? In my opinion the first line of attack should be to carry out a general survey throughout Canada in order to determine, firstly, what factors underlie the causes of infant mortality, and secondly, to what extent existing facilities are adequate to deal with the situation. This survey might be made by representatives of Federal, provincial, municipal, and local health authorities with the collaboration of the medical profession and of the national voluntary health agencies. As a result of this investigation, a definite plan embodying the close co-operation of all interested bodies might be made with a view to applying particular remedial measures in definite sections of the country.

While the health and welfare of the child is primarily the responsibility of the father and mother, a share of the burden rests with the community inasmuch as the main duty of society is to look after the well-being of its members. Saving the lives of children, and physically adjusting them to present social conditions, require a high degree of humanization, a proper appreciation of social values, and a sound application of scientific knowledge.

The problem, I repeat, is of prime importance, and on the results of our endeavours to meet the need depends the future of our civilization. Such a stake surely deserves the best Canada can give.

# The Specificity of Typhoid and Paratyphoid Vaccines

M. H. BROWN, M.D., B.Sc.(MED.), D.P.H., AND A. J. BISHOP
*Connaught Laboratories and School of Hygiene, University of Toronto*

THE efficacy of typhoid vaccine in preventing typhoid fever is generally accepted. The incidence of the disease in the armies during the Great War is cited as evidence of its value. In the early days of the war, it became evident that paratyphoid infection was occurring among the troops on the Western Front. In 1915, Dreyer et al. (1) pointed out that typhoid vaccine would not protect against paratyphoid infection and this led to the introduction and use of typhoid triple vaccine (typhoid, paratyphoid A and B) in the British Army. In 1917, the triple vaccine was introduced for use in the U.S. Army and Navy. In March, 1924, the U.S. naval authorities discontinued the use of both paratyphoid fractions and in October, 1927, the paratyphoid B fraction was discontinued in the Army but the A fraction retained. Hawley and Simmons (2) later pointed out that paratyphoid fevers had declined in incidence in the Navy before the paratyphoid fractions were added to the vaccine, and since their elimination from the vaccine paratyphoid fevers had increased less rapidly than typhoid fever in that service. Further, these authors state that in their opinion the experience in the American Army and Navy suggests that a potent typhoid vaccine may control paratyphoid fever and that there is no evidence that the reverse is true to the same degree.

Because of these conflicting opinions, the experiments outlined in this report were carried out to explore the specificity, if any, of typhoid and paratyphoid vaccines in animals. In the light of the work of Grinnell (3), Perry, Findlay, Bensted (4) and others with protection tests in mice, this species of animal was selected. It is admitted at the outset that results obtained from protection tests in mice may not be referable to the immunity in man; nevertheless, the results are clear-cut.

The general procedure adopted was to inject intraperitoneally a group of mice with vaccine and then test the protection conferred, by injecting a portion of them with a suspension of homologous culture of living bacilli and another portion with the living heterologous suspension. Unvaccinated controls were likewise injected with living suspensions.

## PREPARATION OF VACCINE

The vaccines were prepared by growing a freshly mouse-passed culture on 3 per cent. beef infusion agar 18 hours, then washing off with saline and heating in a water-bath at 54°C. for one hour. Following this, 0.3 per cent. tricresol

was added and suitable dilutions were made. The mice received 0.5 cc. of this vaccine which contained 50 million micro-organisms and one week later they received another injection of 0.5 cc. of the vaccine containing 100 million micro-organisms. Ten days later they were injected intraperitoneally with the living culture suspended in saline.

The typhoid vaccine was prepared from a pure "V" form culture of the Rejuvenated Rawlings strain of *Bact. typhosum*. A living suspension in saline of this culture killed a very high percentage of mice in a dose of 175 million as gauged by an opacity standard compared with a counted suspension of *Bact. typhosum*. This amount may conveniently be called the M.L.D. subject to the limitations imposed by the term when applied to bacterial suspensions.

The paratyphoid B vaccine was prepared from R.A.M.C. Rowland strain. The suspension of living micro-organisms of this strain was lethal for a high percentage of mice in amounts of 150 million. The paratyphoid A strain used was R.A.M.C. Mears. The lethal dose of living bacteria was 300 million.

The following protocols illustrate the results obtained. All mice dying within 72 hours were autopsied and heart's blood cultured on MacConkey's medium. Representative mouse cultures were identified by the utilization of suitable carbohydrates. With the exception of one animal (table III) all cultures were identified within the limitations as above detailed.

The results given in table I show that mice vaccinated with typhoid vaccine were protected completely against as much as 4 M.L.D.'s or 700 million living typhoid bacilli. No demonstrable protection was conferred against a living suspension of paratyphoid B or against paratyphoid A bacilli.

The results outlined in table II in which mice were vaccinated with paratyphoid B vaccine indicate that a high degree of protection is conferred against

TABLE I

RESULTS OF MOUSE PROTECTION TESTS
Typhoid vs. Paratyphoid B and Paratyphoid A

| Mice Vaccinated with Typhoid Vaccine (R.A.M.C. Rawlings) | | | | | |
|---|---|---|---|---|---|
| Injected with living suspension *Bact. typhosum* | | Injected with living suspension *Bact. paratyphosum B* | | Injected with living suspension *Bact. paratyphosum A* | |
| 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million | 20 mice; 2 M.L.D. or 300 million | 20 mice; 4 M.L.D. or 6000 million | 20 mice; 2 M.L.D. or 600 million | 20 mice; 4 M.L.D. or 1200 million |
| All survived | All survived | 19 died 1 survived | All died | 19 died 1 survived | All died |

| CONTROLS | | |
|---|---|---|
| *Bact. typhosum* | *Bact. paratyphosum B* | *Bact. paratyphosum B* |
| 20 mice; 1 M.L.D. or 175 million | 20 mice; 1 M.L.D. or 150 million | 20 mice; 1 M.L.D. or 300 million |
| 16 died; 2 survived | 16 died; 4 survived | All died |

TABLE II

RESULTS OF MOUSE PROTECTION TESTS
Paratyphoid B vs. Typhoid and Paratyphoid A

| Mice vaccinated with *Bact. paratyphosum* B vaccine (R.A.M.C. Rowland) | | | | | |
|---|---|---|---|---|---|
| Injected with living suspension *Bact. typhosum* | | Injected with living suspension *Bact. paratyphosum B* | | Injected with living suspension *Bact. paratyphosum A* | |
| 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million | 20 mice; 2 M.L.D.or 300 million | 20 mice; 4 M.L.D. or 600 million | 20 mice; 2 M.L.D. or 600 million | 20 mice; 4 M.L.D. or 1200 million |
| 16 died 4 survived | 19 died 1 survived | All survived | All survived | 3 died 17 survived | 16 died 4 survived |

| CONTROLS | | |
|---|---|---|
| *Bact. typhosum* | *Bact. paratyphosum B* | *Bact. paratyphosum A* |
| 20 mice; 1 M.L.D. or 175 million | 20 mice; 1 M.L.D. or 150 million | 20 mice; 1 M.L.D. or 300 million |
| 19 died; 1 survived | All died; | 13 died; 7 survived |

paratyphoid B infection but not against typhoid infection. The results of the injection of living culture of paratyphoid A are not quite so clear-cut. The survival of 17 mice following the injection of two M.L.D.'s of living suspension of paratyphoid B suggests some protection afforded by the vaccine of paratyphoid B. This is not borne out when the dose of living culture is raised to 4 M.L.D.'s. However, there were more surviving mice in the control group than at any time recorded in this study. This fact suggests that the M.L.D. was not very sharp. It is conceded that an "average lethal dose" (A.L.D.) would have been more appropriately used and that the suspending medium, broth in place of saline. Whatever slight protection paratyphoid B vaccine may be assumed to have conferred against the living culture of paratyphoid A, there is no evidence of the converse (table III).

Similarly, in table III, the mice vaccinated with typhoid vaccine succumbed when injected with a living culture of paratyphoid A, and mice vaccinated with paratyphoid A vaccine succumbed to living typhoid bacilli but survived the injection of living paratyphoid A bacilli.

It has been suggested that the intraperitoneal route of vaccinating mice may introduce a non-specific factor so that any micro-organism may alter the peritoneal cells and render them immune to subsequent injections of living typhoid or paratyphoid bacilli. The validity of this hypothesis was investigated by injecting groups of mice respectively with pneumococcus type I vaccine, *dysenteriae* Flexner W vaccine, and *Bact. alkalescens* vaccine. These vaccines were prepared according to standard practice by growing on suitable solid media, washing off with saline, heating at 56°C. and subsequent addition of a preservative. The vaccines were comparably diluted as outlined above and given in two doses (50 and 100 million), one week apart, with a rest period of 10 days follow-

TABLE III

RESULTS OF MOUSE PROTECTION TESTS
Paratyphoid A vs. Typhoid and Paratyphoid B

| Mice vaccinated with *Bact. paratyphosum A* (R.A.M.C. Mears) | | | | | |
|---|---|---|---|---|---|
| Injected with living suspension *Bact. typhosum* | | Injected with living suspension *Bact. paratyphosum B* | | Injected with living suspension *Bact. paratyphosum A* | |
| 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million | 20 mice; 2 M.L.D. or 300 million | 20 mice; 4 M.L.D. or 600 million | 20 mice; 2 M.L.D. or 600 million | 20 mice; 4 M.L.D. or 1200 million |
| 18 died 2 survived | All died | 19 died 1 survived | All died | All survived | 1 died* 19 survived |

CONTROLS

| *Bact. typhosum* | *Bact. typhosum B* | *Bact. typhosum A* |
|---|---|---|
| 20 mice; 1 M.L.D. or 175 million | 20 mice; 1 M.L.D. or 150 million | 20 mice; 1 M.L.D. or 300 million |
| 18 died; 2 survived | All died | 17 died; 3 survived |

*Cult. isolated not paratyphoid A.

ing the last dose. The animals were then given the intraperitoneal injection of living typhoid bacilli.

The following protocols illustrate the results obtained (table IV).

TABLE IV

RESULTS OF MOUSE PROTECTION TESTS

Dysentery, Pneumococcus, Alkalescens vs. Typhoid

| Mice vaccinated with *dysenteriae* Flexner W. vaccine | | Mice vaccinated with pneumococcus vaccine | | Mice vaccinated with *Bact. alkalescens* | |
|---|---|---|---|---|---|
| Vaccinated mice injected with living *Bact. typhosum* | | Vaccinated mice injected with living *Bact. typhosum* | | Vaccinated mice injected with living *Bact. typhosum* | |
| 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million | 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million | 20 mice; 2 M.L.D. or 350 million | 20 mice; 4 M.L.D. or 700 million |
| 16 died 4 survived | All died | 19 died 1 survived | All died | 16 died 4 survived | 16 died 4 survived |

| Controls | Controls |
|---|---|
| Living *Bact. typhosum* | Living *Bact. typhosum* |
| 20 mice injected 1 M.L.D. or 175 M. | 20 mice injected 1 M.L.D. or 175 M. |
| 15 died 5 survived | 17 died 3 survived |

It may be observed that any protection which may have been conferred by these various vaccines is very slight. The fact that a sharp M.L.D. for the living typhoid bacilli in this particular experiment was not obtained in the controls may explain the survival of the small numbers in the groups vaccinated with *alkalescens* and *dysenteriae* vaccines.

## SUMMARY

There is no experimental evidence to support the contention that a potent typhoid vaccine may protect man against paratyphoid B or paratyphoid A infection. The evidence presented suggests that the protection conferred by the vaccines of typhoid, paratyphoid B, and paratyphoid A is specific.

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# A Third Outbreak of Staphylococcal Food Poisoning in Hamilton, Ontario*

JAMES ROBERTS, M.D.
*Medical Officer of Health*

AT last year's meeting of the Ontario Health Officers Association I discussed Dr. A. E. Ranney's paper on food handlers and during the course of my remarks emphasized the futility of examining food handlers in the light of our experience and results which were considered insufficient justification of the time, the effort expended, and the cost. Our view was that no advantage would accrue from the physical examination of food handlers since, to be of value, such examinations would have to be so thorough that they would be impracticable from the standpoint of time and cost. An outbreak of staphylococcal food poisoning which had occurred in Hamilton just before the meeting was cited as evidence that only a comprehensive examination supported by laboratory investigation will reveal conditions inimical to the public health.

The first outbreak of 1938 occurred in March and affected 21 persons in 5 families. Custard-filled pastries were suspected and subsequent investigation revealed the presence of *Staphylococcus aureus*. This organism was isolated by Dr. W. J. Deadman from the gastric contents and faeces of members of a family that had been hospitalized as a result of this food infection, and also from jam pails, pastry bags, and milk taken from a can in the bakery. Employees were carefully examined and bacteriological tests made. *Staphylococcus aureus* was demonstrated in cultures taken from swabs of the noses and throats of 4 of these employees.

Another outbreak involving 8 persons in 4 families occurred in May, 1938, and further examination was made of nasal and throat swabs from employees. Subsequent swabbing was undertaken weekly thereafter and the employees from whom positive cultures were obtained were excluded from their employment until such time as their cultures were successively negative. Two of them who had persistent positive cultures were advised to seek other employment and did so.

Through the co-operation of the School of Hygiene, University of Toronto, Mr. R. J. Wilson made a study of the strains of staphylococcus obtained from the various pastries and the noses and throats of employees. The following quotation from his report is illuminating and emphasizes the practical difficulties to be encountered and the meagre results likely to accrue from a mere routine examination of food handlers at infrequent intervals:

"The data furnished by this investigation leave little doubt as to the etiological agent of the outbreak and the source of infection of the food. There are several points of interest

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of which particular note might be made. Since the micro-organisms were so widely disseminated throughout the bakery, it seems reasonable to believe that one person had spread the infection to his fellow employees and thence it was conveyed to the raw materials, utensils and finished food products. Although the epidemiological investigation showed that the bakery was in a sanitary condition and that reasonably good care was exercised in handling of the finished products, such widespread infection among the employees created a hazard that could scarcely be obviated by the usual means of control. Adequate refrigeration of the cream filler and the finished products in the bakery to prevent growth of the contaminating micro-organisms and elaboration of the enterotoxin would not ensure that such precautions would be taken after the pastry had been purchased. Further, it is evident from the repeat cultures that the absence of clinical evidence of a nose or throat infection in the employees was no indication that they were not harbouring the micro-organism. . . . It was found that the micro-organism was present in the noses and throats of the employees three weeks after the first outbreak but had disappeared at six weeks. However, two of the employees who were not harbouring the micro-organism at the time of the first outbreak were found to be infected six weeks later. One of these remained so for three weeks, but the micro-organism had disappeared from his nose and throat before the recurrence of the food poisoning. The other employee harboured the organism for at least a month previous and a week subsequent to the second outbreak."

## THE 1939 OUTBREAK

I obtained the first intimation of the outbreak in March of this year by overhearing a conversation between two persons who had attended a dinner the previous evening. It was stated that several persons attending had become acutely ill with vomiting and diarrhoea, with the inference that the meat eaten at the dinner was the probable cause.

Shortly after, the manager of a local bakery called on me to report that he had received similar reports.

Subsequently, a number of cases of illness were reported to the Department of Health by physicians. In each instance the person affected had symptoms suggestive of food poisoning.

The first reports involved members of 15 families. Our investigations quickly showed that this outbreak was much more extensive than the outbreak reported the year before. Members of 47 households were found to be affected.

In almost every case the symptoms were abdominal pain, vomiting, and diarrhoea. The duration of the illnesses varied from 1½ to 15 hours. In one family, however, it was stated that vomiting persisted for 5 hours in the father's case and 3 and 4 days in the cases of daughter and mother, respectively. Another family reported the duration of the illness to be 36 hours in the instance of two members and 3 days in the instance of a third member. Numerous cases were reported as having suffered general weakness with pain in the limbs following the acute symptoms. In all cases investigated the time elapsing between the meal and the first symptoms varied from 1 to 6 hours.

It was found that every patient had attended a dinner at a local church on the evening of March 23rd. Prompt steps were taken to determine which article

of food served at the dinner was responsible for the poisoning. The meal consisted of cold roast pork, applesauce, beans, potatoes, and gravy. The latter was supplied cold and heated at the time of the dinner. Cocoanut-cream pie was served as dessert, with coffee and cream.

From our previous experience the pies served at the dinner were immediately suspected as being the cause of the illness. However, samples of all foods were secured and submitted to the laboratory for examination.

As near as could be determined, 150 persons attended the dinner or assisted in its serving. Of these, 102 were recorded as having eaten pie. Ninety-six became ill and 6 stated that they did not experience any symptoms.

In the families affected there were 6 who partook of the meal with the exception of the pie. These persons were not ill. The remaining 42 either were not ill or experienced such slight symptoms as did not necessitate reports of illness. There is also the possibility that some of these did not eat the pie.

Subsequent to the initial report of illnesses outlined above, we received on March 25th reports of similar illness in 3 families in a different section of the city. Upon investigating these it was learned that pies of like nature and from the same source of supply had been eaten. The bakery management undertook to obtain from their route salesmen reports of further cases of infection from pies manufactured at the same time and under the same conditions as those sent to the church dinner. These involved a total of 50 persons in 16 families. Of these 50 persons, 5 who ate pie were not ill. An additional 10 persons in these families did not eat pie and were not ill.

The pies that were incriminated by our laboratory investigation were similar in composition to those responsible for the outbreak in 1938. The boiled cream filler was composed of flour, corn starch, butter, egg-yolk, granulated sugar, salt, milk, and vanilla flavouring. Shredded cocoanut was added to the pies supplied for the church dinner. The meringue was made with egg-white, sugar, salt and cream of tartar. The mixture was prepared in the usual manner by boiling the milk and adding the other ingredients. This was ladled while hot into shells of pie-crust that had been baked previously. Meringue was added and the whole placed in the hot ovens for a short period, possibly two minutes, to brown slightly.

One hundred and eleven pies were prepared. Forty were supplied for the church dinner, 70 were allotted to route salesmen, and one was taken to the home of an employee of the bakery. The pies were made in the late afternoon of March 22nd. After being allowed to remain on racks for a short time, they were placed in individual boxes and left in the room until the following morning. Some of the pies were said to be still warm when they were placed in the containers. The room in which they remained overnight was considered cool. On the day of manufacture of the pies, the outside temperatures were 24°F. at 8 a.m. and 22° at noon, while the lowest temperature was 20°. On the following day these

temperatures were 38°, 43°, and 24°, respectively, and on March 24th, 42°, 53°, and 34°.

The 40 pies were delivered to the church about 4 p.m., approximately 24 hours after manufacture, and kept at room temperature until served about 7 p.m.

Inspection of the bakery premises showed that plant and equipment were in excellent sanitary condition and methods of manufacture were satisfactory, but storage facilities for the finished products, while clean, could not be termed satisfactory, as refrigeration, although available, was not used.

In one instance where illness was reported it was found that part of the pie had been eaten on March 23rd. The remainder was kept overnight in the refrigerator and eaten on the following day. Both members of this family were ill.

One case investigated showed that a person became ill a second time after consuming pie on two occasions one day apart.

In all, 63 families were affected. In 31 of these it was necessary to call upon physicians to treat 70 persons. Two cases were removed to hospital by physicians. In these, a short period of hospitalization was followed by apparent recovery.

In the bacteriological study of material from this outbreak, experience gained in the outbreak of March 1938 was useful as a guide. While the cream pies were at once suspected, samples of all the food supplied at the banquet were examined. The results were negative in all but the cream pie, from which cultures of *Staphylococcus aureus* were isolated, as they were from a sample of pie which had been taken home from the banquet by one of the individuals taken ill. The bakery was visited and a pie from the batch which had not been issued, secured, as well as one from the home of one of the bakery employees, who had taken it home and had become ill after partaking of it. From both these samples, *Staphylococcus aureus* was isolated. All employees of the bakery who had worked in the preparation of this batch of pastry were clinically examined, and cultures taken from nose and throat by Dr. Deadman. From five out of eight of these individuals, cultures of *Staphylococcus aureus* were obtained. All cultures of staphylococcus were forwarded to Mr. R. J. Wilson of the School of Hygiene, University of Toronto, for study to determine if enterotoxin was produced. One employee was found to be harbouring a strain of the organism corresponding to the strain isolated from the pies. Mr. Wilson's report is presented separately. The accompanying table shows the detailed bacteriological findings made in the City Laboratories.

A very frequent source of such poisoning has been found to be cream- and custard-filled bakery products. The work of C. E. Dolman, Jordan and Burrows, K. F. Meyer, and G. J. Kupchik has provided our knowledge of the epidemiology and bacteriology of such poisonings. These studies leave no doubt as to the fact that certain strains of staphylococci have the ability to produce a powerful enterotoxin occasioning very severe symptoms when food containing the organism is

TABLE I

Bacteriological Findings of the City Laboratories

| Culture | Name | Source of Culture | Direct Smear | Culture | Date |
|---|---|---|---|---|---|
| 970 | Church | Cream pie | Gr. pos. cocci − | Staphylococcus aureus | 24/3/39 |
| 971 | From H. home | Banana cream pie | Gr. pos. cocci + | Staphylococcus aureus | 24/3/39 |
| 972 | Mr. J. B. | Nose | —— | No pathogens | 24/3/39 |
| 973 | Mr. J. B. | Throat | —— | No pathogens | 24/3/39 |
| 974 | Miss H. F. | Nose | —— | No pathogens | 24/3/39 |
| 975 | Miss H. F. | Throat | —— | Staphylococcus aureus | 24/3/39 |
| 976 | Mr. R. G. | Nose (bloody) | —— | Staphylococcus aureus | 24/3/39 |
| 977 | Mr. R. G. | Throat | —— | Staphylococcus aureus | 24/3/39 |
| 978 | Mr. E. R. | Nose | —— | No pathogens | 24/3/39 |
| 979 | Mr. E. R. | Throat | —— | No pathogens | 24/3/39 |
| 980 | Mrs. A. W. | Nose | —— | No pathogens | 24/3/39 |
| 981 | Mrs. A. W. | Throat | —— | No pathogens | 24/3/39 |
| 982 | Miss J. | Nose | —— | Staphylococcus aureus | 24/3/39 |
| 983 | Miss J. | Throat | —— | Staphylococcus aureus | 24/3/39 |
| 984 | Miss P. E. No. 1 | Nose | —— | No pathogens | 24/3/39 |
| 985 | Mrs. P. E. No. 2 | Throat | —— | No pathogens | 24/3/39 |
| 986 | Mrs. B. No. 2 | Nose | —— | Staphylococcus aureus | 24/3/39 |
| 987 | Mrs. B. No. 2 | Throat | —— | No pathogens | 24/3/39 |
| 997 | Mr. McK. | Banana cream pie | Gr. pos. cocci − | Staphylococcus aureus | 25/3/39 |
| 998 | Mr. S. | Banana cream pie | Gr. pos. cocci − | Staphylococcus aureus | 25/3/39 |
| 999 | Church | Beans | Gr. pos. cocci − | No pathogens | 25/3/39 |
| 1000 | Church | Meat | Gr. pos. cocci − | No pathogens | 25/3/39 |
| 1008 | Brought in by Mr. J. | Vomitus? (saliva) | Gr. pos. cocci + | Pneumococcus | 27/3/39 |
| 1074* | Mr. R. G.† | Nose (still sore) | —— | Staphylococcus aureus | 1/4/39 |
| 1075 | Mr. R. G.† | Throat (appears red). Right tonsil enlarged and red | —— | No pathogens | 1/4/39 |
| 1234* | Miss J.† | Nose | —— | Staphylococcus aureus | 13/4/39 |
| 1235 | Miss J.† | Throat | —— | No pathogens | 13/4/39 |

*Cultures 1074 and 1234 were sent to Toronto for examination by Mr. Wilson.
†Repeat culture.

eaten. Cream- or custard-filled confections or pastries afford the opportunity for rapid growth of staphylococci if such food products are stored at a suitable temperature for growth. Such conditions pertain during the summer months. The strains capable of producing enterotoxin appear to be human in origin and contamination of the food products occurs in the preparation or subsequent handling.

In conclusion, I wish to thank Dr. Deadman and Mr. F. J. Elliott of our laboratory for their prompt and hearty co-operation in the investigation and for the preliminary laboratory studies; and my Chief Sanitary Inspector, Mr. Gompf, and his staff for their careful epidemiological work in connection with the illness of those concerned. Particularly do I wish to extend much thanks and credit to Mr. R. J. Wilson of the School of Hygiene, whose work in the study of the enterotoxic properties of strains of *Staphylococcus aureus* isolated was the most important link in the chain of evidence which established bacteriologically the etiology of this outbreak and without which the evidence would be presumptive only.

## Laboratory Findings

R. J. WILSON, M.A.
*School of Hygiene, University of Toronto*

THE findings in this report recall those obtained during investigation of the two outbreaks that occurred in Hamilton in March and May, 1938, and reported in the JOURNAL by Roberts et al.[1] The cream-filled pastry incriminated on the two occasions was traced to the same bakery. Epidemiological data in the 1939 outbreak also incriminated cream pies obtained from a local bakery, and strains of staphylococci isolated from the pies and from the noses and throats of employees connected with the preparation of the pastry and fillings were sent to this laboratory for confirmation of their findings.

Table I summarizes the data obtained by laboratory examination of the cultures. The identity of the strains 970 and 971 isolated from portions of the pies consumed at the church social and in a private residence supplied by the same bakery, with those isolated from the nose and throat of the employee in charge of the preparation of the fillings, was established by comparing their toxigenic characteristics. The kitten test was employed to demonstrate the presence of the food-poisoning principle in filtrates prepared from the several strains. The data shown in the table clearly indicate the original source of the contamination of the food. Repeat cultures taken from the nose and throat of the employee four months after the outbreak revealed the presence of the same strain of staphylococcus.

[1]Roberts, James, W. J. Deadman, and R. J. Wilson: An Outbreak of Staphylococcal Food Poisoning, *Canad. Pub. Health J.*, 1938, **29**:325.

Laboratory investigations conducted over a period of a year have revealed that the owner of the bakery involved in the outbreak of March, 1938, harboured the same strain of staphylococcus in his nose and throat from March, 1938, to April, 1939, in spite of medical treatment, and he has been designated as a carrier. This person had apparently conveyed infection to other members

TABLE I

STRAINS OF STAPHYLOCOCCI ISOLATED DURING THE INVESTIGATION OF AN OUTBREAK OF STAPHYLOCOCCAL FOOD-POISONING IN HAMILTON, CANADA, APRIL, 1939

| No. | Patient | Source | Hemolysis on Blood Plate | Colour | Hemolytic Titres | | Lh Dose | Kitten Test |
|---|---|---|---|---|---|---|---|---|
| 970 | From church . | Pie | Wide primary | Aureus | 4096 | 512 | 0.05 cc. | + |
| 971 | From home H. | Pie | Wide primary | Aureus | 4096 | 512 | 0.05 cc. | + |
| 975 | Miss F..... | Throat | Wide primary | Aureus | 2048 | 128 | 0.12 cc. | 0 |
| 976 | Mr. R.G..... | Nose | Wide primary | Aureus | 1024 | 128 | 0.12 cc. | 0 |
| 977 | Mr. R.G..... | Throat | Non-hemolytic | Albus | — | — | — | |
| 981 | Miss W..... | Throat | Non-hemolytic | Albus | — | — | — | |
| 982(a) | Miss J..... | Nose | Wide primary | Aureus | 4096 | 512 | 0.06 cc. | + |
| 982(b) | Miss J..... | Nose | Non-hemolytic | Albus | — | — | — | |
| 983(a) | Miss J..... | Throat | Wide primary | Aureus | 4096 | 512 | 0.06 cc. | + |
| 983(b) | Miss J..... | Throat | Non-hemolytic | Albus | — | — | — | |
| *1234 | Miss J..... | Nose | Wide primary | Aureus | 4096 | 512 | 0.06 cc. | + |
| †1649 | Miss J..... | Nose | Wide primary | Aureus | 4096 | 512 | 0.06 cc. | + |
| †1650 | Miss J..... | Throat | Wide primary | Aureus | 4096 | 512 | 0.06 cc. | + |

*Strain 1234 was isolated from Miss J.'s nose 1 week after the outbreak.
†Strains 1649 and 1650 were isolated from Miss J.'s nose and throat four months after the outbreak.

of the bakery staff and to the utensils and food; and the same strain of staphylococcus was isolated from the cream-filled pastry on both occasions (tables II and III).

It is of further interest to note that the persons implicated in each outbreak showed no visible signs of infection. This fact is rather disturbing when one comes to consider the control of this type of food poisoning. Figures quoted by several authors show that the incidence of staphylococcus in the noses of the general population is high (table IV). The proportion of these strains that may produce food poisoning is not known with certainty, but several surveys of strains from various sources indicate that roughly 40 per cent. of these are enterotoxigenic, as shown by the kitten test (table V). If these observations be true, the probability of food contamination, with possible food intoxication, is very great, since the nose and throat microflora provide a vast

TABLE II

STRAINS OF STAPHYLOCOCCI ISOLATED FROM PASTRY AND UTENSILS DURING THE INVESTIGATION OF TWO OUTBREAKS OF STAPHYLOCOCCAL FOOD POISONING ORIGINATING IN THE SAME BAKERY IN HAMILTON, CANADA, MARCH AND MAY, 1938, AND FROM THE NOSE AND THROAT OF THE OWNER OF THE BAKERY FROM MARCH 1938 TO APRIL 1939

| No. | Patient | Source | Date | Hemolysis on Blood Plate | Colour | Hemolytic Titres | | Lh Dose | Kitten Test |
|---|---|---|---|---|---|---|---|---|---|
| 456 | Family 1. | Pie | 10.3.38 | Wide primary | Aureus | 1024 | 256 | 0.05–0.07 | + |
| 457 | Family 2. | Pie | 10.3.38 | Wide primary | Aureus | 1024 | 256 | 0.05 cc. | + |
| 516 | Bakery... | Pastry bag | 10.3.38 | Wide primary | Aureus | 1024 | 256 | 0.05 cc. | + |
| 489 | W.R.S.... | Throat | 10.3.38 | Wide primary | Aureus | 1024 | 256 | 0.05–0.07 | + |
| 717 | W.R.S.... | Nose | 2.4.38 | Wide primary | Aureus | 1024 | 256 | 0.05 cc. | + |
| *1162 | Bakery... | Vanilla slice | 1.6.38 | Wide primary | Aureus | 2048 | 256 | 0.05 cc. | + |
| 1545 | W.R.S.... | Nose | 20.7.38 | Wide primary | Aureus | 2048 | 256 | 0.07 cc. | + |
| 1043–2 | W.R.S.... | Nose | 2.4.39 | Wide primary | Aureus | 1024 | 256 | 0.05 cc. | + |

*Strain 1162 was isolated from a vanilla slice that was incriminated in a second outbreak originating in the same bakery, six weeks after the first one.

TABLE III

STRAINS OF STAPHYLOCOCCI ISOLATED DURING THE INVESTIGATION OF AN OUTBREAK OF FOOD POISONING IN HAMILTON, ONTARIO, MARCH, 1938

| Group | Strain | Source | Pigmentation | Hemolysis on Sheep's Blood Agar | | Toxin Production | | | Kitten Test |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Primary Zone | Secondary Zone | Hemolytic Titres | | Lh dose | |
| 1 | 456 | Cream pie.... | Aureus | Wide | None | 1024 | 256 | 0.05–0.07 | |
| | 457 | Lemon roll ... | Aureus | " | " | 1024 | 256 | 0.05 | + |
| | 516 | Pastry bag ... | Aureus | " | " | 1024 | 256 | 0.05 | |
| | 489 | Throat,W.A.S. | Aureus | " | " | 1024 | 256 | 0.05–0.07 | + |
| | *717 | Nose, W.A.S.. | Aureus | " | " | 1024 | 256 | 0.05 | |
| | 494A | Nose, H.B.... | Aureus | " | " | 1024 | 256 | 0.05 | + |
| | 495A | Throat, H.B.. | Aureus | " | " | 1024 | 256 | 0.05 | + |
| | *716 | Throat, H.B.. | Aureus | " | " | 1024 | 256 | 0.05 | |
| | 498 | Infected knuckle, A.N. | Aureus | " | " | 1024 | 256 | 0.05 | + |
| 2 | 494B | Nose, H.B.... | Lemon | " | " | 256 | 128 | 0.2 | |
| | 495B | Throat, H.B.. | Lemon | " | " | 256 | 128 | 0.2 | |
| | 502 | Nose, L.F..... | Aureus | Narrow | " | 128 | 32 | 0.5 | |
| | 503 | Throat, L.F... | Aureus | " | " | 128 | 32 | 0.5 | |
| | *713 | Nose, L.F..... | Aureus | " | " | 128 | 32 | 0.3 | |

*Repeat cultures taken 3 weeks after the outbreak.

Kitten tests were done only on strains 457, 489, 494A, 495A and 498. These were selected as being representative strains.

TABLE IV

THE INCIDENCE OF STAPHYLOCOCCI IN NOSES OF THE GENERAL POPULATION AND IN HOSPITAL PATIENTS

| Author | Number Examined | Staph. Positive | %±S.E. | Number Hemolytic | Coagulase Positive | %±S.E. |
|---|---|---|---|---|---|---|
| Hallman (1937)... | 468 | 355 | 76.3±2.3 | | 244 | 52.1±2.3 |
| Hart (1937)..... | 54 | 39 | 70.4±6.2 | | | |
| McFarlan (1938).. | 165 | 142 | 86.1±2.9 | 67 | | 40.6±3.8 |

TABLE V

THE INCIDENCE OF ENTEROTOXIGENIC STRAINS AMONG STAPHYLOCOCCI ISOLATED FROM VARIOUS SOURCES, AS SHOWN BY THE KITTEN TEST

| Author | Source of Cultures | Number of Strains | Positive | Negative | % Positive | |
|---|---|---|---|---|---|---|
| Gwatkin 1937 | Bovine Normal Udders and Mastitis | 17 | 7 | 10 | 41.1 | |
| Kupchick 1937 | Various sources, (excluding food poisoning) | 19 | 9 | 10 | 47.4 | |
| Dolman & Wilson 1938 | Raw milk | 11 | 9 | 2 | 81.8 | |
| | Frozen fruits and vegetables | 4 | 3 | 1 | | |
| | Clinical | 4 | 4 | 0 | | |
| Minett 1938 | Acute mastitis | 7 | 4 | 3 | 57.1 | |
| | Chronic mastitis | 8 | 5 | 3 | 62.5 | 42.1 |
| | Normal milk | 23 | 7 | 16 | 30.4 | |
| | Milk (non-hemolytic strains) | 12 | 1 | 11 | 8.3 | |

well of potential infection. Further, strains of bovine origin are capable of elaborating an enterotoxin, and many outbreaks reported in the literature have been attributed to milk from mastitic cows. A high percentage of strains of bovine origin are known to be enterogenic (table V). Thus it would seem that the problem of control is directed along two main routes. Since so many outbreaks occur as a result of the consumption of milk, milk products, or foods in which milk is used during preparation, efficient pasteurization should be enforced wherever possible; and regulations should be promulgated for the care and handling of cream fillings during and after preparation.

# EDITORIAL SECTION

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## THE ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

THE sixty-eighth annual meeting of the American Public Health Association was held in Pittsburgh on October 17th to 20th. It was preceded by the holding of the sixth Institute on Public Health Education. Although not the largest of recent meetings of the Association, it was attended by more than 2500 public health workers from the United States, Canada, Cuba, and Mexico.

In the United States great advances have been made in the organization of public health since 1935, when funds were made available by the Federal Government to assist state departments in conducting wider public health programs. As a result of such Federal Government participation, the number of full-time county health units in rural areas has been greatly increased and large numbers of physicians, nurses, and sanitarians have received post-graduate courses and have been qualified for their duties. In spite of such advances, a large part of the population is still without adequate health services. "Health for three-thirds of the nation" was therefore appropriately chosen as the theme of the meeting. It was the subject of Dr. Abel Wolman's presidential address and of other addresses.

The controversies which have been waged in the medical profession concerning the ways and means for the more adequate provision of medical care were reflected in the discussions of this year's meeting. "Public health at the cross-roads" was a frequent expression. Two views were prominently presented. One emphasized that the public health department should not be responsible for the administration of plans for medical, dental, and nursing care for those who cannot afford to provide such services for themselves and for their families, and that the inclusion of such a function would be detrimental. Such a view was strongly expressed in the address of Professor Haven Emerson of Columbia University. Public health, he contended, was a specialized field of medicine and the American Public Health Association should retain its professional character as a society of those qualified to deal with public health problems. If it did not do so, he feared that it would become "a sounding board for social theorists and legislative Utopias." He felt that there was no need for Federal intervention

in the practice of personal medicine in times of peace, except in the period of great calamities.

The opposite view was expressed by Dr. Edward S. Godfrey, Jr., President-elect of the Association. He expressed the view that the present opposition of so-called organized medicine to the expansion of public health service rests on grounds that are hardly tenable. Organized medicine, he said, must join in a constructive national health program. In Dr. Godfrey's opinion, the Wagner National Health Bill, which will be before the next session of Congress and is the centre of heated debate, did not go far enough. He urged the socialization of medicine so that it will include not only preventive medicine but also curative medicine—"medicine delivered without distinction as to race, creed, occupation, or income, for no less than three-thirds of the people." Supporting the position of Dr. Godfrey, Dr. Joseph W. Mountin, of the United States Public Health Service, stressed the view that the health department is the appropriate agency for the administration of public medical care. He indicated that tax-collected funds can only be expended with satisfaction to the public by public authorities, finding much support for his position through a careful analysis of public-health department activities in the field of preventive medicine. The meeting therefore served the highly valuable function of focusing attention on the present position of public health in the United States in its relation to medical care.

Almost every aspect of public health work was presented at the meeting. The program presented general sessions and sessions of ten Sections of the Association. Each of the Sections sponsored from three to seven individual and joint sessions. There were more than three hundred speakers. During the meeting the Sedgwick Memorial Medal, awarded for distinguished service in public health, was presented to Dr. Thomas Parran, Surgeon General of the United States Public Health Service. In making the presentation, Dr. Milton J. Rosenau expressed the pleasure of all workers in public health in this honour to Dr. Parran, stating that Dr. Parran "has endeared himself to his professional colleagues by his personal modesty in the midst of national acclaim and distinction, and to all who know him and know of him by his ringing challenge to action against the inertia and indifference of the generations to neglected human health."

Canada was honoured by the appointment of Miss Elizabeth L. Smellie, C.B.E., Chief Superintendent of the Victorian Order of Nurses for Canada, as the First Vice-president of the Association for the coming year. This appointment was unique in the history of the American Public Health Association, Miss Smellie being the first of the women in public health to occupy this office. To us in Canada the recognition of Miss Smellie's outstanding services in the field of public health is most pleasing, and to the members of the nursing profession throughout the continent a matter of great satisfaction.

Dr. W. S. Leathers, Dean of the School of Medicine and Professor of Preventive Medicine and Public Health, Vanderbilt University, was named President-elect, following the installation of Dr. Godfrey as President for 1939-40. Under the leadership of Dr. Godfrey and Dr. Leathers, the American Public Health Association will continue to make increasingly important contributions to the advancement of public health on this continent.

# PROGRAM

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# EIGHTH ANNUAL CHRISTMAS MEETING OF THE LABORATORY SECTION

## Toronto, December 18-19, 1939

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### MONDAY MORNING, DECEMBER 18th

**Private Dining Room No. 9, Main Mezzanine Floor, 9.15**

**9.15. Registration.** A fee of $1.00 is being charged to cover in part the cost of the meeting.

**9.30. A Study of Methods for Detection of the Presence of Coliform Organisms in Water.** (Report of the Committee on Bacteriological Examination of Water and Sewage.) N. J. HOWARD, Department of Public Health, Toronto; A. G. LOCHHEAD, Department of Agriculture, Ottawa; and M. H. MCCRADY, Ministry of Health of Quebec, Montreal.

**9.45. Preliminary Report on Vi Antigen Agglutination as a Routine Diagnostic Test.** VERA CROSSLEY, JEAN MACALPINE, and HELEN CONWAY, Division of Laboratories, Department of Health of Ontario, Toronto.

**10.00. Observations on Types of B. typhosus.** JAMES CRAIGIE, Connaught Laboratories and School of Hygiene, University of Toronto.

**10.15. Two Phage Susceptible Types of B. typhosus isolated from a Typhoid Fever Case.** DOROTHY E. HELMER, DONNA E. KERR, C. E. DOLMAN, and L. E. RANTA, Division of Laboratories, Provincial Board of Health, Vancouver, and Western Division, Connaught Laboratories.

**10.30. The Specificity of Typhoid and Paratyphoid Vaccines.** M. H. BROWN and A. J. BISHOP, Connaught Laboratories and School of Hygiene, University of Toronto.

**10.45. Cross-Immunity and Enteric Infections.** A. R. FOLEY, Ministry of Health of Quebec, and J. PAQUIN, Nicolet County Health Unit.

**11.00. Serological Study of Streptococci.** HELEN PLUMMER, Connaught Laboratories, University of Toronto.

**11.15. Viability of Haemolytic Streptococci in Stock Cultures.** ROY FRASER, Department of Biology and Bacteriology, Mount Allison University.

**11.30. The Influence of Blood in Culture Media.** F. SMITH, Department of Bacteriology and Immunity, McGill University.

**11.45. An Investigation into a High Count of Pin-point Colonies in Pasteurized Milk.** W. H. BURTON, Newbould Laboratories, Guelph.

**12.00. Improvements in the Preparation of Staphylococcus Toxoid.** R. J. WILSON, Department of Hygiene and Preventive Medicine, University of Toronto.

## MONDAY AFTERNOON

**Room 103, School of Hygiene, University of Toronto, 2.15**

**Short business meeting.**

### DEMONSTRATIONS

**Room 105.**

**Agglutination Test for Leptospira.** A. L. MACNABB and ANGUS MILLAR.

**Influenza.** R. HARE.

**Room 106.**

**Intestinal Parasites.** ELLA KUITUNEN-EKBAUM.

**Room 124.**

**Materials which may be Substituted for Glass Cover Slips for Pathological or Bacteriological Preparations.** STUART PENNY and JESSIE MILLSAP.

**Hornibrook's Semi-synthetic Medium for H. pertussis.** R. J. WILSON.

**A Modification of the Gutzeit Method for the Detection of Arsenic.** J. WYLLIE.

**Room 122.**

**The Use of Tetrathionate Broth as Enrichment Fluid for the Identification of Enteric Organisms.** JEAN MACALPINE.

**Bactericidal Power of Blood from Normal and Immune Guinea Pigs for H. influenzae.** L. N. SILVERTHORNE.

**Room 121.**

**An Acute Infection of Mice due to a Diphtheroid Bacillus.** JAMES CRAIGIE and N. A. LABZOFFSKY.

**Preparation of Vaccine Virus.** R. D. DEFRIES and T. C. CAMPBELL.

**Relationship of Whooping-Cough to Bronchiectasis.** I. H. ERB.

**Typing of Strains.** SALMONELLA COMMITTEE.

**Room 112.**

**The Examination of Pathogenic Fungi and the Handling and Method of Maintaining Stock Cultures.** W. B. MCCLURE.

**Classification of Haemolytic Streptococci.** HELEN PLUMMER.

**Room 114.**

**An Original Method of Obtaining Sputum from Infant Children.** W. J. AUGER.

**Synthetic Medium for B. typhosus.** J. W. FISHER.

**Tea will be served in room 54 from four o'clock to four forty-five.**

## MONDAY EVENING

**Informal Dinner, Private Dining Room No. 9, Royal York Hotel, 6.45**
(Tickets, $1.50)

*Election of Officers.*

### SYMPOSIUM ON VIRUSES

**Speakers:**

WALTER T. HARRISON
Director, Division of Biologics Control,
National Institute of Health, Washington

IGOR N. ASHESHOV
Associate Professor of Bacteriology
University of Western Ontario, London

**Discussion:** JAMES CRAIGIE, CHAS. A. MITCHELL, RONALD HARE.

## TUESDAY MORNING, DECEMBER 19th

**Private Dining Room No. 9, 9.30**

**9.30. Influenzal Meningitis.** L. N. SILVERTHORNE, Connaught Laboratories, University of Toronto.

**9.45. Influenzal Meningitis: Report of a Case Successfully Treated with Sulphapyridine.** G. C. FERGUSON, Port Arthur, and A. E. ALLIN, Branch Laboratory, Department of Health of Ontario, Fort William.

**10.00. Disinfection with Surface-acting Disinfectants.** R. J. SCHNITZER, Connaught Laboratories, University of Toronto.

**10.15. Combined Action of Sulphapyridine and Serum in Experimental Staphylococcus Infection in Mice.** LEONE N. FARRELL, Connaught Laboratories, University of Toronto.

**10.30. The Microflora of the Rhizosphere in Relation to Resistance of Plants to Soil-borne Pathogens.** A. G. LOCHHEAD, M. I. TIMONIN, and P. M. WEST, Division of Bacteriology and Dairy Research, Department of Agriculture, Ottawa.

**10.45. Routine Diagnosis of Pathogenic Fungi in the Public Health Laboratory.** W. B. MCCLURE, Division of Laboratories, Department of Health of Ontario, Toronto.

**11.00. The Intestinal Parasites of Children in Toronto.** ELLA KUITUNEN-EKBAUM, Connaught Laboratories, University of Toronto.

**11.15. Some Notes on Schistosome Dermatitis.** S. HADWEN and A. MURRAY FALLIS, Ontario Research Foundation, Toronto.

**11.30. Active Immunization by the Intranasal Route: A Comparative Study of Various Haemophilus pertussis Antigens.** RUTH P. DOW, Department of Bacteriology and Immunity, McGill University.

**11.45. Preliminary Report on Some Cases of Pasteurella Infection of the Respiratory Tract.** D. H. STARKEY and J. F. MEAKINS, Department of Bacteriology and Immunity, McGill University.

## TUESDAY AFTERNOON

**Private Dining Room No. 9, 2.30**

**2.30. The Isolation and Identification of the Virus of Equine Encephalomyelitis.** F. W. SCHOFIELD, Ontario Veterinary College.

**2.45. Fluctuations in the Titre of Neutralizing Antibody for Influenza Virus in Human Beings.** R. HARE, Connaught Laboratories, University of Toronto.

**3.00. The Laughlen Test for Blood Donors.** PHILIP H. GREEY, Banting Institute, University of Toronto.

**3.15. The Laughlen Test for Blood Donors.** W. L. DONOHUE, Hospital for Sick Children, Toronto.

**3.30. Convalescent Serum Therapy.** WILLIAM THALHIMER, Manhattan Convalescent Serum Laboratory, New York.

**3.45. The Relationship of Whooping-Cough to Bronchiectasis.** I. H. ERB, Hospital for Sick Children, Toronto.

**4.00. Statistical Study: Results of Ten Years' Diagnostic Service on Pathological Tissue Specimens removed at Biopsy.** STUART PENNY and DORIS HOWELL, Division of Laboratories, Department of Health of Ontario.

# BOOKS AND REPORTS

**Classified and Annotated Bibliography of Sir William Osler's Publications.** *By Maude E. Abbott, B.A., M.D., LL.D. Published by the Medical Museum, McGill University, Montreal, 1939. Second edition, revised and indexed. 163 pages. $2.25.*

THIS is the second edition (revised) of Dr. Abbott's classified bibliography of the writings of Sir William Osler. It makes abundantly clear the remarkable scope of his interests and writings and represents a lasting service to students of to-day and of the future.

The bibliography is classified into seven sections, each being subdivided into the various periods of Osler's career and associations in chronological order. The important feature of this revised edition is the comprehensive index to the bibliography which greatly enhances its value for reference purposes. A reproduction of the Vernon plaque is included and the story of it given in the preface by Dr. Henry Barton Jacobs.

*A. Hardisty Sellers*

**The Canadian Family.** *Census Monograph No. 7. Published by the Dominion Bureau of Statistics, Ottawa, 1939. 228 pages. Price 35 cents.*

THE CANADIAN FAMILY is the latest in the series of monographs published by the Dominion Bureau of Statistics analysing data from the decennial census. The monograph is divided into two parts, the first of which presents a historical survey from 1608 to date along with an anlysis of data from the 1931 census. Part two contains various tabular information relative to the discussion.

It is pointed out that the decline of almost two persons in the average size of the Canadian family between 1861 and 1931 is due principally to declining fertility caused by the concentration of population in cities, the trend toward indoor, non-manual and wage-earning occupations, and to the commercialization of farming. Thus stress is laid on the *fundamental* causes of decline in the birth rate and no specific reference is made to contraceptives as a factor although increasing attention is being directed toward such influence as the chief "reason" for the observed trend. It is desirable that stress should be laid on the factors which are believed to underlie the changes in respect to such practices. Possible means of offsetting the trend are suggested.

An appendix is included which explains simply the various statistical procedures employed in the analyses undertaken. This is a commendable supplement which will be appreciated by many readers.

*A. Hardisty Sellers*

**New Light on Old Health Problems.** *The Proceedings of the 17th annual conference of the Milbank Memorial Fund held March 23 and 24, 1939, at the New York Academy of Medicine. Published by the Milbank Memorial Fund, 40 Wall Street, New York, 1939. 85 pages.*

NEW LIGHT ON OLD HEALTH PROBLEMS is the appropriate title of the proceedings of the seventeenth annual conference of Milbank Memorial Fund. "Periodic stock taking and the exploration of new roads to health" have always been the aims of these conferences. Such policy is desirable not only in the interests of economy of effort and efficiency of service but also if a proper perspective of the field of action is to be maintained by public health leaders.

The title is appropriate because of the subject matter dealt with by the conference: The Hygiene of Housing, and Nutrition—Its Public Health Aspects. More recent years have shed

new light on these old problems and scientific developments have opened up ways to improved health through these two old channels. Population problems were discussed under the heading, The Changing Status of Group Differences in Fertility. The proceedings make clear the relationships between these three—housing, nutrition and population.

New developments are summarized by eminent authorities and the needs for more fundamental research along specific lines is clearly stated. As a scientific digest of progress and a guide to future action and policy, the Proceedings are profitable reading.

*A. Hardisty Sellers*

**Annual Report of Hospitals in Canada for the year 1937.** *Dominion Bureau of Statistics, Ottawa, 1937. 86 pages. Price 25 cents.*

THIS report presents statistics on all hospitals in Canada except sanatoria, and institutions for mentally ill, feeble-minded and epileptic which are published in separate documents. The report is divided into three sections, the first of which gives general information including the number, types and distribution of public and private hospitals, bed capacity, personnel, medical and social service, schools of nursing, organized out-patient departments, etc. Section 2 deals with hospitals operated under the Federal government and section 3 with the activities of the Victorian Order of Nurses for Canada and the Canadian Red Cross Society.

In recent years steady progress has been made through the Canadian Hospital Council and provincial hospital associations in co-operation with the Bureau, toward eliminating many of the differences in recording practices in Canadian hospitals. Through the adoption of standard schedules for all provinces, a similar success in achieving uniform financial returns will ultimately permit a material extension of the sphere of usefulness of the Bureau's activities in this field. Meanwhile the staff of the Institutional Statistics Branch and in particular Mr. J. C. Brady are to be congratulated on splendid progress.

*A. Hardisty Sellers*

**Population, Race and Eugenics.** *By Morris Siegel, M.D. Published by the author, 546 Barton Street East, Hamilton, Ontario, 1939. 204 pages. Price $3.00.*

THIS book presents a good discussion of the essential problems of race and eugenics. The book is divided into two parts, positive eugenics and restrictive eugenics. The former includes a limited discussion of causal factors in certain population trends, racial theories in relation to eugenics and constructive marriage policy. The second part of the book, dealing with restrictive aspects of eugenics, contains some rather pertinent remarks on the trends in feeble-mindedness and mental disorders together with a discussion of restrictive measures in relation to these.

The text is characterized by its remarkably sane treatment of recorded "facts" and by an absence of bias. This is especially noticeable in the sections dealing with mental disorders and the conservative attitude in this and other phases together with its clear and simple style fit the book well to its purpose.

Frequent reference is made to the principal reliable authorities in various fields. In this connection a collected bibliography might have been worth while.

*A. Hardisty Sellers*

# CERTIFICATE IN SANITARY INSPECTION (CANADA)

## C.S.I.(C.)

Provision for the certification of sanitary inspectors in Canada has been made since 1935 by the Canadian Public Health Association. Qualified candidates who complete the requirements of the Association, including examination, are granted a certificate of competency: CERTIFICATE IN SANITARY INSPECTION (CANADA)—C.S.I. (C.).

The examinations extend over three days and are practical, oral, and written. One day and a half is utilized by the candidate in making a report on an assigned local inspection and for the conduct of the oral examination. Three written examinations covering the subjects of the syllabus occupy the remaining day and a half.

Applicants are required to present evidence of having obtained an acceptable secondary-school education, namely the successful completion of at least three years of high-school work or its equivalent in secondary-school education.

Evidence is required also of experience in all branches of sanitary inspection.

A syllabus outlining the subjects of the examination and the requirements for registration, together with application forms, may be obtained by addressing the Committee on the Certification of Sanitary Inspectors. Copies of the 1939 examination papers are available if desired.

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The 1940 examinations will be held in the various provincial centres on September 18th, 19th, and 20th.

**CANADIAN**
**PUBLIC HEALTH ASSOCIATION**
105 BOND STREET, TORONTO, ONTARIO

# Why Canada is Healthier...

## AND HOW YOU CAN HELP TO KEEP IT THAT WAY

### YESTERDAY

**1909**—Thirty years ago in an average community tuberculosis was the leading cause of death. Such other diseases as typhoid fever, scarlet fever, diphtheria, whooping cough, and measles were also common causes of death. The annual toll of fatalities from preventable causes was entirely too high.

### *Today*

**1939**—During the past three decades, the death rate for tuberculosis, according to latest available figures, has declined more than 66%; for influenza and pneumonia, 24%; for measles, 87%; for whooping cough, 59%; for diphtheria, 90%; for scarlet fever, 87%.

CANADIANS BORN TODAY HAVE, on the average, a prospect of living ten years longer than those born a generation ago.

More people now live to see their heart disease, cancer, or syphilis completely cured or checked.

Tens of thousands are enjoying years of life they would have been deprived of a generation ago by diabetes, pernicious anemia, or tuberculosis.

Progressive Canadian communities have banished diphtheria, typhoid fever, smallpox as public hazards—and *every* community can! Safety education has created safer environments in homes and factories, and helped reduce accidents.

▶*Why* is Canada so much healthier?

Because a tireless, eminently capable body of men and women—medical and public-health workers, and those engaged in safety work—have within one lifetime so brilliantly extended our defenses against disease and causes of death.

They have discovered the causes of many diseases and have produced effective vaccines and serums for their prevention and treatment. They have safeguarded our milk, water, and food supplies and the very air we breathe. They have helped us establish efficient health departments.

▶How can *you* help Canada to maintain its enviable health record?

First of all, by guarding your own health—having regular medical check-ups and seeing your doctor promptly in the event of sickness. Second, by concerning yourself with the efficiency of your community's health services. And third, by giving your support, whenever you have the chance, to the cause of better local health conditions.

# METROPOLITAN LIFE

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